

Mr. Selater read an extract from a letter addressed to him by Mr. J. H. Gurney, F.Z.S., dated Northrepps, Norwich, May 23rd, 1876. Mr. Gurney stated that a pair of the variety of the Common Swan, usually called the Polish Swan (*Cygnus immutabilis* of Yarrell), which had been deposited by the Society under his care for the purpose of breeding, had just hatched five healthy Cygnets, which did not appear to Mr. Gurney to differ materially from those of the ordinary form. The general colour of the upper parts was brownish grey with a slight tinge of dull pale rufous; the head, throat, and breast were white. The white colour, however, was not abruptly marked off from the grey, but the boundaries of the two tints were somewhat blended.

Mr. Selater remarked that the usual notion was that in the Polish Swan the Cygnets were invariably of a pure white\*, and that it was for the purpose of ascertaining whether this idea was correct that the pair of Swans in question had been placed under Mr. Gurney's charge, at the suggestion of Prof. Newton, in order that they might have a better chance of breeding. The Swans had been originally received of a dealer in exchange in May 1871, and had not bred in the Society's Gardens, the space available for them being too limited.

The following papers were read:—

1. Notes on the Skeleton of *Ziphius novæ-zealandiæ*. By JULIUS VON HAAST, Ph.D., F.R.S., Director of the Canterbury Museum.

[Received May 5, 1876.]

(Plates XLV. & XLVI.)

At the end of July 1872 the report reached me that a Whale had been stranded on a reef in Lyttelton Harbour, Banks Peninsula, and that the carcass had been towed to one of the small bays by several fishermen for securing the oil.

Being myself prevented by indisposition, Mr. Fuller, the Taxidermist of the Museum, proceeded to that locality with instructions to secure the skeleton and to make the necessary observations as to the dimensions, form, sex, and age of the animal.

When he arrived where the fishermen were at work, he found that the blubber had nearly all been taken off, so that he could only partially obtain the required measurements.

The animal, which on dissection proved to be an aged female, had a total length of 26 feet; and Mr. Fuller describes the body as being rather thick in the middle, tapering to a slender tail without showing the least trace of any dorsal fin. Colour bluish black on the upper portion of the body, white beneath, the upper portion being marked with numerous oval spots, 2 to 3 inches across, like the skin of a Leopard.

\* See Yarrell's 'British Birds,' vol. iii. p. 131 (1843).

Fig. 1

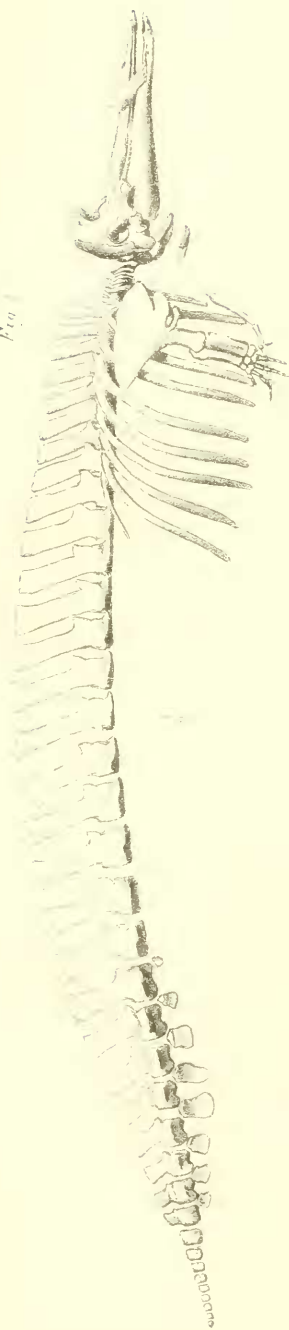
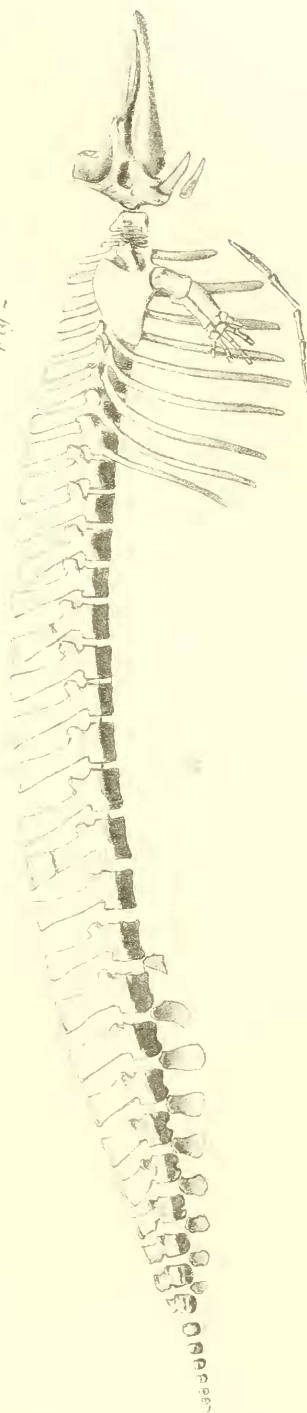


Fig. 2





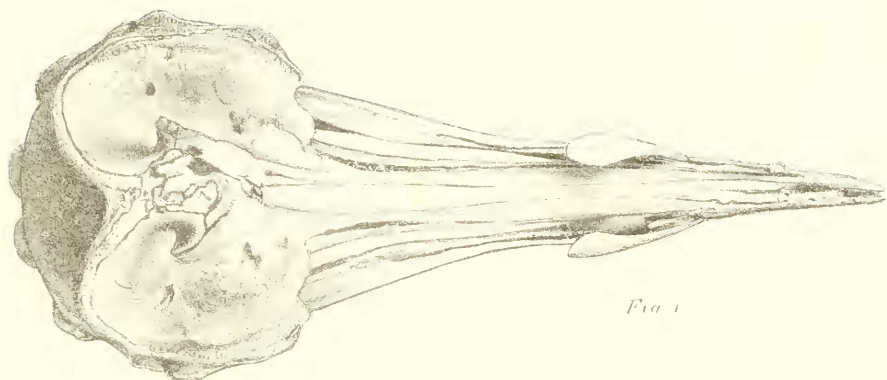


Fig. 1

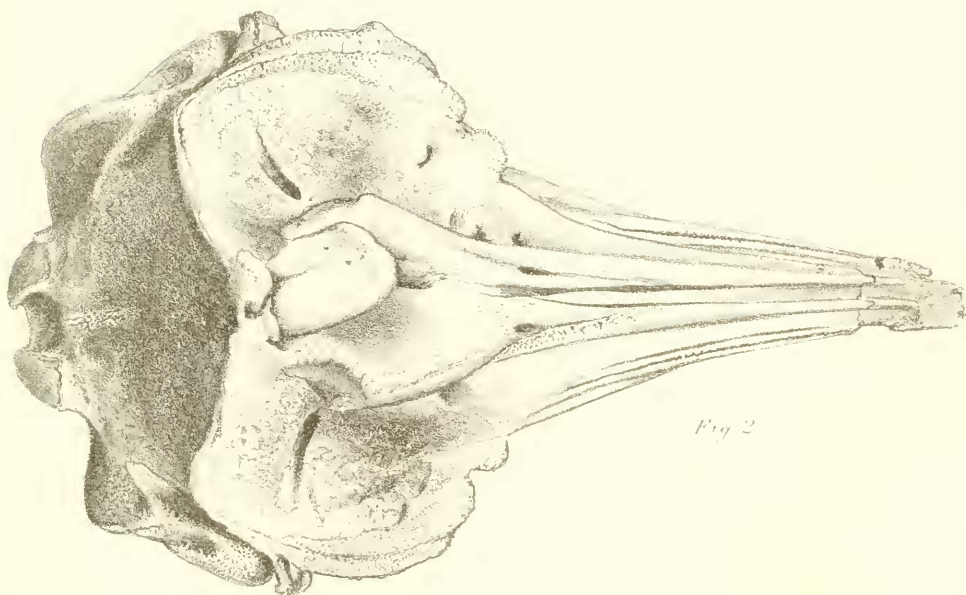


Fig. 2

(Great 10th)

SKULL OF MEGALODON (GOWEN 1869)  
 SKULL OF TITANIC HOPE (ALLEN 1869)



The head was much swollen. The whole skeleton, with the exception of a few bones, was secured for the Canterbury Museum, where it now stands articulated in one of its rooms. The accompanying drawing (Plate XLV. fig. 2) gives its outline.

Before, however, entering into a description of the principal portions of the skeleton, I wish to draw attention to the fact that our specimen did not possess a dorsal fin; nor did a careful examination by Mr. Fuller of the central line of the back reveal the least fragment of one, or even the indication that it ever existed. However, this absence cannot be claimed as a generic character, because the *Ziphius australis* of Burmeister (see the excellent Memoir on that species in 'Anales del Museo Publico de Buenos Aires,' part v., by that distinguished veteran naturalist) possesses a well-developed dorsal fin.

Moreover the forehead of the New-Zealand species is much swollen, whilst the head of the South-American species previously alluded to is tapering. Thus, in the enumeration of the principal characteristics of the genus *Ziphius* (see amongst others Gray's 'Catalogue of Seals and Whales,' page 340), this feature also must lose generic value. Dr. Hector, in the 'Transactions of the New-Zealand Institute,' vol. v. page 165, has given a short description of the skull of a specimen, under the name of *Ziphius chathamensis*, which, if not belonging to the same species, is closely allied to the animal of the New-Zealand coast. That skull was obtained on the Chatham Islands.

However, as amongst minor differences the form of the teeth is different, I have thought it more expedient to describe the New-Zealand specimen under the specific name of *Ziphius novæ-zealandiæ*, leaving it to the future student, when more material has been collected, to determine whether there are two distinct species or not.

The skull (Plate XLVI. fig. 2) has the following dimensions:—

	ft.	in.
Extreme length with lower jaw . . . . .	3	3·12
Extreme length of cranium, point of rostrum (which is broken off) restored . . . . .	3	1·50
Length of rostrum, from the apex of the præmaxillæ to the middle of the line drawn between the ante-orbital notches . . . . .	1	7·89
Greatest height, from top of nasals to lower border of pterygoids . . . . .	1	5·52
Greatest breadth, across postorbital processes of frontals . . . . .	1	10·75
Breadth of occipital condyles . . . . .		6·30
„ of foramen magnum . . . . .		42·0
Height of foramen magnum . . . . .		2·22
Breadth of base of rostrum between bottom of ante-orbital notches . . . . .	1	0·91
Breadth of rostrum in the middle . . . . .		4·83
Anterior nares, greatest width of the two . . . . .		3·20
Height of crest above occipital foramen . . . . .	1	2·93
Width of occiput . . . . .	1	4·60

<i>Mandible.</i>		ft.	in.
Length of ramus.....		2	8.50
„ of symphysis .....			7.46
Vertical height of ramus at coronoid process .....			6.40
Apex of mandible, projecting beyond apex of rostrum (restored) .....			1.62
Mandibular tooth (right), length .....			2.12
„ „ greatest breadth .....			0.72
„ „ weight .....		184	grains.

It will be seen, in comparing these dimensions with those of the skull from Chatham Islands, figured and described by Dr. Hector, that it is larger and more developed, with the exception of the two mandibular teeth, which are much smaller and in the Chatham-Island specimen are evidently designed for other purposes.

The rostrum, of which the point is broken off, is of small dimensions when compared with the posterior portion of the cranium, its point being slightly turned to the right. This point was shattered into such a number of small pieces that, after maceration, it was impossible to secure them all. The same was the case with the point of the lower jaw, so as to suggest to us that the animal had struck the reef and thus injured so considerably that portion of its frame.

The *premaxillaries* are two thin bones which run parallel in their anterior portion. They here curve inwards, so as to form a semi-cylindrical excavation, running along the whole rostrum as far as the septum narium.

Before reaching this, however, they alter somewhat their general form, the rounded edge disappearing, the bones now showing a plane rather concave surface, and, gradually rising near the posterior end of the nares, unite here with the nasal bones, by which a high crest is formed. For about one third from the point both sides of the premaxillaries are alike, after which the right one becomes much broader than the left one; and, passing over the median line of the skull to the left, the skull now becomes very unsymmetrical in its central portion, so that the opening of the nares is displaced to the left. Moreover the uppermost portion of the right premaxillary, besides being broader, is much higher than the left one—a peculiarity to which also the nasal bones conform, the right one being considerably higher than the left one. The prefrontals (of Owen) begin 6.5 inches from the anterior point of the rostrum, gradually widening to one inch, being slightly concave in the centre for a length of 8 inches. They then gradually flatten for a distance of one inch, after which they become convex until they rise and form the thin ridge of the septum narium. The latter is wedged in its anterior portion against the left premaxillary, and, continuing its direction to the left, joins then obliquely the nasal bones. In the centre of the nares, the septum narium is excavated for a depth of nearly 2 inches and a width of 1.20 inch, the bone having here a very sharp edge.

Shortly before the septum narium is formed, the premaxillaries coalesce for a short space\*.

The *maxillaries*, which begin with a narrow point having a downward sloping surface, gradually widen; and, after having in about the centre of the rostrum a plane surface, the outer side rises to the orbital notch, after which they expand greatly with a deeply concave surface, rising posteriorly to the highest part of the crest, uniting with the frontals through their whole extent.

The high maxillary crest of *Hyperodon* is represented only by a small elevation at the beginning of the broad concave surface, similar to that in *Ziphius australis*, as pointed out by Prof. H. Burmeister in his exhaustive description of that South-American species.

A deep and narrow furrow begins on the lower side of both premaxillaries near the point, continuing after their junction with the maxillaries along the latter bones, where it runs below their lateral edge to about the middle of the rostrum, gradually getting shallower and narrower. In these grooves small vascular cavities are observable, as if they had once served for rudimentary teeth, of which, however, not the least remnant could be observed, all without doubt having been absorbed.

The vomer begins 5·5 inches from the point of the rostrum between the premaxillaries, forming for 8·76 inches a narrow convex ridge, which in its broadest or central portion is only 0·25 inch broad. The palatal surface of the rostrum is slightly bent upward near the point.

The *united periotic and tympanic bones* are of considerably less size than those of *Berardius arnouxii*. The tympanic bone is shorter, the anterior end not being so much prolonged and thus resembling more in form the same bone in *Hyperodon*. The same can be said of the periotic bone, which is also not only shorter, but has the notches between the lobes much shallower than in *Berardius*.

The *lower mandible*, which projects about 2 inches beyond the point of the rostrum, consists of two thin callous rami, which gradually become narrower till their termination at the point, the bony substance of which they are composed getting more spongy towards the beginning of the symphysis. From this beginning the united bones curve upwards. At the point two small teeth are imbedded in sockets, the tips rising only a few lines above them. They are covered with rugose cement to the very point, which, in their lower part, forms wartlike prominences.

As there is scarcely any difference between the two teeth, I give only the dimensions of one of them, the left one, which is 2·12 inches long, with the greatest breadth about at the centre of 0·72 inch. It weighs 184 grains, and runs out at both ends to a constricted rounded point, that of the apex being the narrowest.

It will thus be seen that the weight of this tooth, although it belongs

\* I give these details, because in another skull of the same species which the Canterbury Museum possesses, and of which I shall give the measurements with some notes below, besides some minor points, a very marked difference occurs in the form of the prefrontals.



to a skull of larger dimensions than the one obtained from the Chatham Islands, described by Dr. Hector, is scarcely the fourth of the weight of the tooth of the latter. It is moreover evident that the teeth of the Chatham-Island specimen must have been used, as, according to the description, they are worn down into two lateral facets, divided by an acute ridge (see 'Transactions New-Zealand Institute,' vol. v. page 165), whilst in the New-Zealand specimen the tips are as rough as the sides and roots and do not show the least sign of wear.

We know that the two skulls of the New-Zealand specimens belong to female skeletons, whilst the skull of the Chatham-Island specimen may possibly have been that of a male; but as we have not the least evidence in that respect, this can only be settled by future researches into the anatomical characters of this interesting genus.

Returning to the skeleton under consideration, I wish to state that the teeth were only visible after maceration, and appear to be altogether functionless, because the lower jaw projects so much beyond the rostrum—unless we assume that the whole had an upper lip of a somewhat prehensile character. On the upper margin all along the anterior half of each ramus a well-defined groove extends to the dental canal at the anterior extremity, where it is broadest. A considerable number of small vascular canals open into this groove, without, however, showing the least rudiment of teeth.

The coronoid process is marked very feebly; but the condyle is well developed and forms the most posterior portion of the bone. I may here observe that the skull of *Ziphius novæ-zealandiæ* resembles in some respects that of *Ziphius australis* of South America, notwithstanding the difference in the form of the head, the former having a swollen, and the latter having a tapering forehead. In many instances Prof. Burmeister's excellent description of some of its osteological characters could be applied quite well to the New-Zealand species.

#### *Hyoid bones.*

The basihyal and the thyrohyals are still unankylosed, notwithstanding the great age of the animal. The former has a somewhat trapezoidal form, thus resembling in that respect the same bone in *Ziphius australis*; but it is more pointed in its anterior portion and has a deep notch in the centre, whilst in the South-American species the anterior border is only slightly concave. Breadth 4·6 inches, antero-posterior length on both sides of the notch 4·1 inches. The thyrohyals have a length of 6·80 inches, with their greatest breadth of 2·55 inches one third from their posterior end.

The stylohyals are 10·8 inches long, and, in their middle portion, 2·1 inches broad; they are straighter than the same bone in *Ziphius australis*, which they resemble, however, otherwise in form. The whole apparatus is more slender than in the Buenos-Aires species.

#### *Vertebral Column.*

The following are the numbers of vertebrae:—

Cervical . . . . .	7
Thoracic . . . . .	9
Lumbar . . . . .	11
Caudal . . . . .	19
	—
	46

In comparing this number with that observed in *Ziphius australis*, it will be seen that the New-Zealand species has three vertebræ less, viz. 9 thoracic instead of 10, and 19 caudal instead of 21, thus showing also some difference in the osteological structure of the two species. I may here observe that all the epiphysal plates of the vertebræ are so thoroughly coalesced with the rest of the body that the line of junction is not visible—a proof that the animal must have been not only adult, but aged.

#### *Cervical Vertebræ.*

Of these the first four are entirely ankylosed, whilst the 5th, 6th, and 7th are free, thus having one free vertebra less than *Ziphius australis*, in which only the first three cervical vertebræ are united; however, as this skeleton was derived from a young animal, this difference cannot be claimed as of a permanent character, until we know the skeleton of the same animal in a full-grown state. The atlas, which is 11·4 inches broad by 8·15 inches high, forms with the next two vertebræ one solid bone with a high crest; it is the largest of all the cervical vertebræ. The parapophyses (lower processes) in each of the coalesced bones, of which that of the atlas is the largest, are, with the exception of that belonging to the fourth, well developed. They decrease, however, gradually in size to the third, that of the fourth being of such small dimensions that it is an inch shorter than the same process in the preceding one, with which it is ankylosed at the upper and lower extremities, but not with the body.

The fifth cervical vertebra is very narrow, 0·55 inch; it has moreover no spinous process above the arch, the summit of which stands two inches below the point of the spinous process of the four ankylosed vertebræ; the parapophyses, although much larger than those of the fourth cervical vertebra, stand on the same line with them. The sixth cervical vertebra is a little broader than the preceding one; there is only an indication of a spinous process above the arch; the parapophyses are well developed, and advance half an inch beyond those of the former vertebra.

The seventh vertebra is slightly broader than the preceding one. It has a distinct spinous crest standing two inches above the arch. The lower process, or parapophysis, on each side has dwindled to a narrow tubercle, sloping upwards; the body of the bone has a well-marked articular surface for the head of the first rib, on both sides, which is situated between the well-marked upper transverse process (diapophysis) and the small tubercle representing the lower transverse process (parapophysis). These seven vertebræ have a length of 7·15 inches measured along the lower side of their main body.

*Thoracic Vertebrae.*

Their number, as before stated, is nine. In this respect the New-Zealand species resembles *Hyperodon*, which, as far as I am aware, is the only other known Ziphioid Whale having such a small number of thoracic vertebrae. Each vertebra has a spine standing backwards at an angle of 60 degrees to the body of the vertebra. That of the first one is pointed, 6·4 inches high, and 2·05 inches broad at the base. Gradually these spinous processes rise higher and become broader at the same time, that of the 9th or last thoracic vertebra being the highest, 11·62 inches, and 3·46 inches broad at the base. They are all laterally compressed, thinning out at the top to a mere blade.

The first two vertebrae possess on both sides of the arch a rounded apophysis, on which the articular extremity for the tubercle is placed. This apophysis gradually enlarges, being laterally compressed and showing one well-marked process pointing upwards and forwards, as well as the articulation for the tubercle for the rib, which is situated more backward.

On the seventh vertebra this separation of the apophysis is still more conspicuous, whilst on the eighth vertebra a separation of that apophysis into two distinct portions has taken place, the forward or superior process now appearing as the metapophysis, whilst its lower or posterior portion forms now a lower transverse process, on which the articular surface for the eighth rib is situated, directed obliquely backwards.

This lower transverse process is already situated in front, on the body of the vertebra, but on its upper portion. This division is still more conspicuous in the ninth or last thoracic vertebra, where the metapophysis has nearly the same form as that on the first lumbar vertebra, with the exception that its upper surface has a rounder instead of a horizontal edge. The lower transverse process has a more depressed, flattened form; moreover it is situated not only in the centre of the body of the vertebra, but also lower down and nearly on the same level as the same process in the first lumbar vertebra.

The bodies of the vertebrae gradually increase in size, the first having an antero-posterior length of 1·65 inch, and the ninth, or last, of 4·1 inches.

The inferior surface of the first thoracic vertebra is rough and rounded. The second, third, and a small portion of the anterior part of the fourth have a shallow concave groove, after which on the fourth a median keel appears, which continues to run along the rest, gradually becoming more pronounced.

*Lumbar Vertebrae.*

The nine thoracic vertebrae are succeeded by eleven lumbar vertebrae, which nearly all possess the same form, attaining larger dimensions as they follow each other, so that the body of the last is the largest—viz. 5·48 inches for the first, and 7·58 inches for the last lumbar vertebra. The spines are of considerable size, the first being 13·25 inches high along its posterior margin; they then gradually rise to the eighth, which is 15·52 inches high, after which

they diminish again slightly. They are compressed as usual, and broader at the apex, which has a truncate form, as if they were cut off.

The metapophysis on the anterior end of the arch is similar in form to that of the last thoracic vertebra, but a little larger in the first four vertebræ, its apex having moreover a still more truncated edge. Beginning with the fifth vertebra this process gets gradually smaller, assuming at the same time a more rounded form. They all possess on their inferior surface a median keel, which is most pronounced on the 5th, 6th and 7th vertebræ, after which, getting shallower by degrees, it nearly runs out on the last.

The lower transverse process is throughout of the same form and size, having a horizontal and a little forward direction.

The *caudal vertebræ* are 19 in number, of which the first 10 have chevron bones attached to them on the posterior border of the lower surface, thus forming as usual two distinct classes.

The bodies of the *caudal vertebræ* shorten from 7·51 inches to the tenth, which is only 3·78 inches long, although their height is the same.

From the 1st to the 13th a broad shallow groove runs along their lower surface, after which they have a deep lateral excavation.

The spines are also gradually reduced in height to the tenth, in which the same is only 1·50 inch high. They continue, however, to possess the same truncated apex, with a downward slope from front to back, getting at their starting-point from the arch gradually larger, that on the 4th caudal vertebra being here the largest of the whole series of vertebræ.

The metapophyses also gradually diminish, and assume, instead of the former flattened form, now a stouter appearance with a more outward direction of the point.

The same diminution in size is observable in the lower transverse process, which on the 8th caudal vertebra forms only a very small ridge, but has entirely disappeared on the 9th. The 10th vertebra is very much laterally compressed; the 11th assumes a rounded form, which becomes more square in the 12th, after which the rest have a nearly quadrangular form to the last.

The last caudal vertebræ, beginning with the 10th, have a well-excavated channel running along both sides of the vertebræ. I may here observe that the last chevron bone, as well as the 17th and 19th vertebræ, are missing.

#### *Ribs.*

There are nine ribs on each side, of which seven possess two articulating processes. The first, which is the shortest of the whole series, is also the broadest. It is thick and flattened throughout. It articulates by a distinct capitular process with the body of the seventh cervical vertebra, and above by an excavated articular surface with the transverse process of the first thoracic vertebra.

From the second to the sixth, the ribs gradually lengthen, the sixth being the longest, after which they decrease again. The second has